Key Concern	Navy Response	Regulatory Comment
Strike and Dip	• Field visits with Navy and HDOH took place in December 2018, and follow-up correspondence has occurred to reconcile approaches and estimates. • Navy proposed two strike-and-dip values to use: 213.6S/2.9D, along with 184.6S/5.9D for sensitivity analysis.	• Navy's proposed strike-and-dip values are acceptable for groundwater flow and saturated zone transport modeling. • Additional discussion is required regarding the vadose zone as smaller scale geologic variation plays a critical role.
Saprolite Extents	• Navy proposed evaluating two interpretations of the saprolite (one deeper than the other) and continuing drilling in south Halawa valley for better understanding of saprolite geometry.	• Navy's proposed path forward is acceptable with the following expectation: newly-obtained boring results (e.g., RHMW14) are incorporated, and revisions and updates to the 3D geologic model are shared with the regulators in a timely manner.
Preferential Pathways	• Technical discussions occurred between regulator and Navy consultants. • The typical morphology and orientation of lava flows at Red Hill make it is highly unlikely that a preferential pathway exists that is orthogonal to that flow direction. • Effects of within-flow preferential pathways will be evaluated using sensitivity analysis.	• Sensitivity or uncertainty analyses are appropriate ways to examine the relation between preferential pathways and migration potential. • However, the Navy's work needs to rest upon a consistent conceptual model for these preferential pathways across the scales of interest. Random walk / fractal approaches were discussed as a possible method to accomplish this.

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Caprock, Tuffs and Sediments	• Navy incorporated more features into their 3D geologic model based on interpretation of tuffs, sediments and caprock. • Navy shared working-version of 3D geologic model with regulators (November 2018). • 3D geologic model is being used to update the groundwater flow model structure and parameterization.	• Current representation of these features in working-version of 3D geologic model is a significant advance on the previous geologic model. • Additional discussion and review will be needed as the 3D geologic model is finalized and used to develop the groundwater flow and transport model, and as sensitivity analyses are undertaken.
Drinking Water (Red Hill) Tunnel Inflows	• Navy modeled Red Hill Shaft using non—uniform inflow more closely approximating documented patterns, and report the model to be insensitive to this feature. • Additional analysis is being conducted to this and is ongoing.	• Regulators appreciate the work completed to date on this; however, substantial sensitivity in the flow model was not anticipated. Rather, appropriate representation of this feature is one part of the broader CSM regarding preferential pathways for flow and more critically, transport (for example, in continuity with features identified at the tank farm). • Additional discussion and review will be needed as the 3D geologic model is finalized and used to develop the groundwater flow and transport model, and as sensitivity analyses are undertaken.

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Calibration to Groundwater Heads and Gradients	• Navy's model with a clinker zone beneath Red Hill best matched measured heads. • Transfer Function Noise (TFN) analysis has been developed evaluate changes in heads under historical conditions to support calibration.	• The TFN analysis is suitable for developing response functions and understanding stress-response relations, a critical element of the model calibration. • Understanding of measured hydraulic gradients and the model correspondence with those remains a critical element that the TFN cannot directly inform. • Complementary methods and further discussion will be needed to address this aspect as the groundwater flow model calibration proceeds.
Coastal Marine Boundary and Discharge	• The model is insensitive to this with RHS pumping, and sensitive to this when RHS is not pumping. • Navy agrees to consider and discuss this further with the regulators as a part of the October 2019 model.	• This is an acceptable path forward at this time given the information that is currently available. • Ongoing discussion between the navy, regulators, and USGS will be needed as the groundwater model is applied to evaluation conditions at Red Hill.
LNAPL Fate and Transport	• Navy and Regulatory agencies have had three focused technical discussions on this topic.	• *Agencies considering alternative approaches to LNAPL holding model.* • Further technical discussion is needed to reach agreement on the details of the path forward. • *Critical to agree on parameters & release scenarios*

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Groundwater Data	• The Navy has re-examined the existing data and has re-articulated their basis for their interpretation of those data.	• *The agencies have identified lines of evidence that support inclusion of analytical detections in question, such as:*
		  • *Lab data reported within accepted bounds*
		  • *TPH data valuable as positive detections of fuel impacts*
		• *AOC deliverables must be able to accommodate Regulatory Agency interpretations.*

LNAPL Presence and Distribution	• The Navy presented to the Agencies information regarding the presence of LNAPL in the area of the upgradient (higher-numbered) Red Hill storage tanks. • The Navy is continuing to examine available data (including temperature, TEAs, PVOCs, vapor, etc.) and is refining its interpretation of those data. • The Navy continues to discuss the progress of these analyses and evaluations with the Agencies.	• The path forward with this topic is tied to the development of a shared understanding of the groundwater data, soil data and vapor data. • *Persistence and presence of LNAPL residual in the subsurface is an important aspect of the AOC deliverables.* • *Absent additional data collection, this will remain an uncertain aspect of the CSM and conservatism will be applied.* • This discussion is ongoing.